Algebra 1 | Unit 9 - Quadratic Equations | Notes

Practice Finding the Vertex by Completing the Square

Find the vertex of the quadratic functions by completing the square.

a. $f(x) = x^2 + 6x + 11$

b. $y = x^2 - 10x + 2$

c. $g(x) = x^2 + 4x$

d. $y = x^2 - 5x + 4$

~~e. $y = 2x^2 + 12x + 18$~~ ~~f. $f(x) = 2x^2 + 8x - 4$~~

1. Set = 0
2. GCF
3. $\frac{b}{2}$

$\frac{-6}{2} = -3$

$(-3)^2 = 9$

$y = x^2 - 6x + 8$

$0 = x^2 - 6x + 8$

$-8 \quad -8$

$9 + -8 = x^2 - 6x + 9$

$1 = (x-3)(x-3)$

$\sqrt{1} = \sqrt{(x-3)^2}$

$\pm 1 = x - 3$

$+3 \quad +3$

$3 \pm 1 = x$

$3+1 = x \qquad 3-1 = x$

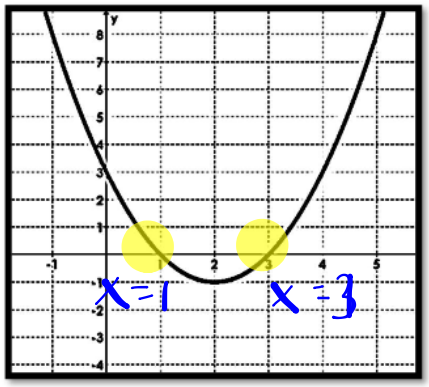
$4 = x \qquad 2 = x$

Day 8/9: Solving by Quadratic Formula

Exploring the Nature of Roots

In this task you will investigate the number of real solutions to a quadratic equation.

1. $f(x) = x^2 - 4x + 3$



a.) How many x-intercepts does the function have?

2

b.) Label and state the x-intercept(s), if any.

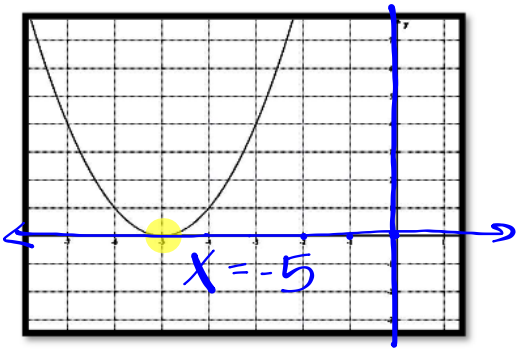
$x=1, \quad x=3$

c.) Solve the quadratic function by factoring, if possible.

$0 = x^2 - 4x + 3$ $\quad x=1$

$0 = (x-1)(x-3)$ $\quad x=3$

2. $f(x) = x^2 + 10x + 25$



a.) How many x-intercepts does the function have?

1

b.) Label and state the x-intercept(s), if any.

$x=-5$

c.) Solve the quadratic function by factoring, if possible.

$0 = x^2 + 10x + 25$

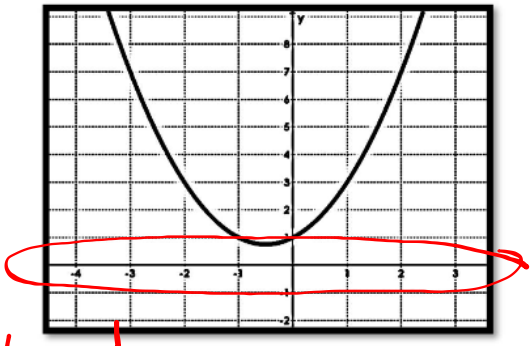
$x+5=0$

$x=-5$

$0 = (x+5)(x+5)$

$0 = (x+5)^2$

3. $f(x) = x^2 + x + 1$



a.) How many x-intercepts does the function have?

none

b.) Label and state the x-intercept(s), if any.

none

c.) Solve the quadratic function by factoring, if possible.

$y = x^2 + x + 1$

not possible to factor!

Algebra 1 Unit 9 - Quadratic Equations Notes

The Discriminant

Instead of observing a quadratic function's graph and/or solving it by factoring, there is an alternative way to determine the number of real solutions called the **discriminant**.

Given a quadratic function in standard form: $ax^2+bx+c=0$, *where* $a \neq 0$,	**Interpretation of the Discriminant (b^2-4ac)**
The **discriminant** is found by using: b^2-4ac	• If b^2-4ac is positive: 2
This value is used to determine the number of real solutions/zeros/roots/x-intercepts that exist for a quadratic equation.	• If b^2-4ac is zero: 1
	• If b^2-4ac is negative: none

Practice: Find the discriminant for the previous three functions: b^2-4ac

a.) $f(x)=x^2-4x+3$

a = 1 b = -4 c = 3

$(-4)^2-4(1)(3)$

$16-12=4$ (positive)

Discriminant: 4 (positive)

#. of real solutions: 2

b.) $f(x)=x^2+10x+25$

a = 1 b = 10 c = 25

$(10)^2-4(1)(25)$

$100-100=\emptyset$

Discriminant: $\emptyset$

# of real zeros: 1

c.) $f(x)=x^2+x+1$

a = 1 b = 1 c = 1

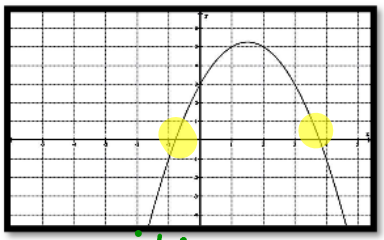
$(1)^2-4(1)(1)$

$1-4=-3$ (negative)

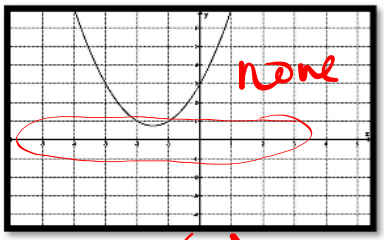
Discriminant: -3 (neg -)

# of real roots: no solution

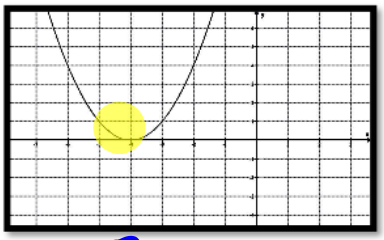
Practice: Determine whether the discriminant would be greater than, less than, or equal to zero.



positive discriminant



neg (-) discriminant



$=\emptyset$ discriminant